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National Weather Service, Wichita

# Fall 2006 Spotter Newsletter



*National Weather Service*  
*Wichita, Kansas*



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# Spring-Summer 2006 Highlights

By: Andy Kleinsasser, General Meteorologist

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Tornadoes, large hail and damaging straight line winds—these are terms every seasoned Kansan knows well during the spring and summer months. Unfortunately, central, south-central and southeast Kansas once again lived up to its notorious reputation for severe weather this past spring and summer. But thunderstorms were not the only contributor of significant weather; drought led to massive spring wildfires, and a mid-summer heat wave claimed several lives across the area.

Very dry conditions during the winter and early spring months led to large and destructive wildfires across the area.

While every significant weather event, no matter how big or small, is treated with the utmost respect and importance by The National Weather Service, only the largest events (both in magnitude and areal extent) will be highlighted in this article. These highlights include (in chronological order): the February 9-10<sup>th</sup> Reno/Harvey County wildfire, the March 8-9<sup>th</sup> Butler County wildfire, the March 30<sup>th</sup> Reno County wildfire, the March 30<sup>th</sup> Montgomery County tornado, the April 6<sup>th</sup> Labette County tornado, the April 24<sup>th</sup> Wichita hail storm, the June 6<sup>th</sup> Turon wind storm, the July 16-20<sup>th</sup> heat wave, and the August 2<sup>nd</sup> Central Kansas wind storm.

## February 9-10<sup>th</sup> Reno/Harvey County Wildfire

At approximately 2:15 pm, February 9<sup>th</sup> a large grass fire broke out along the Reno/Harvey County line just north of Burrton. The fire spread quickly, fed by drought conditions and sustained winds of 25 to 35 mph. The fire was eventually extinguished late in the day on February 10<sup>th</sup>, but not before scorching 8,800 acres and causing approximately \$30,000 of damage to ranch and farmland. In all, 70 firefighting units from 6 counties valiantly worked the fire.

## March 8-9<sup>th</sup> Butler County Wildfire

A large fire started in the early afternoon hours of March 8<sup>th</sup>, just east of Towanda. The fire spread quickly, fed by continued drought conditions and very strong southwesterly winds. The fire caused thick smoke to blow across the Kansas Turnpike, resulting in a two-car accident. In all, the fire charred 10,700 acres of grassland, damaged or destroyed 10 outbuildings, caused minor damage to two homes, set three oil wells ablaze, and caused the evacuation of Oil Hill Elementary School. Approximately 34 state, county, and city agencies valiantly fought the fire, which was declared officially extinguished by 9:00 am, March 9<sup>th</sup>.

## March 30<sup>th</sup> Reno County Wildfire

During the early afternoon hours of March 30<sup>th</sup>, a large wildfire broke out just east of the Hutchinson Airport, near the intersection of 17<sup>th</sup> Avenue and Obee Road. 300-400 people were evacuated from a 21 square-mile area during the late afternoon and evening hours. The fire was eventually extinguished by late Saturday afternoon, April 1<sup>st</sup>. Five houses and 20 outbuildings were destroyed, and numerous campers, auto-



Remnants of manufactured home 2 miles SW of Sycamore. F2 Damage.

Damage from the March 30<sup>th</sup> Montgomery County tornado.

mobiles and farm implements were damaged or destroyed. In all, 5,400 acres were scorched, causing an estimated 1.1 million dollars in damages. Thankfully, no one was injured.

### March 30<sup>th</sup> Montgomery County Tornado

Shortly after 4 pm CST on the 30<sup>th</sup>, a tornado touched down 3 miles northeast of Havana in Montgomery County. The tornado produced F2 damage 4 miles north of Wayside, and again 2 miles southwest of Sycamore. Several homes and mobile homes were damaged or destroyed along its 16 mile path. The most concentrated damage occurred roughly 2 to 3 miles southwest of Sycamore in the township of Radical, where several homes and mobile homes sustained moderate to major damage. Numerous trailers were overturned at Elk City Lake, along with damage at Elk City Lake State Park. Unfortunately, one man was seriously injured 3 miles southwest of Sycamore, when his home was hit by the tornado. In all, the tornado caused an estimated one million dollars in damage.



Large hail from the April 24<sup>th</sup> Sedgwick County hailstorm.

### April 6<sup>th</sup> Labette County Tornado

Shortly after 6 pm CST on the 6<sup>th</sup>, an F1 tornado entered Labette County from Oklahoma, 3 miles southwest of Chetopa. The tornado tracked to the east-northeast where it damaged 2 homes and destroyed a mobile home just south of Chetopa. Unfortunately, twelve injuries occurred. The tornado also flipped a tractor trailer on highway 59. The tornado exited Labette County about 1 mile south of highway 166 and moved into Crawford County. Along its 4 mile path, the tornado caused an estimated \$225,000 in damage.

### April 24<sup>th</sup> Sedgwick County Hailstorm

An early morning severe thunderstorm pounded western and central portions of Sedgwick County with destructive hail as large as 3 inches in diameter between roughly 6:10 and 6:30 AM CST. Several instances of 1.75 to 3 inch hail occurred from Goddard into western and central portions of Wichita, roughly between 13th and Kellogg, and east into the downtown area. The large hail inflicted widespread property damage across the Wichita area, some of which was rather severe, to automobiles, homes, and businesses. In all, the hailstorm caused an estimated 70 million dollars in damage. It was the costliest hailstorm to hit Wichita since 1992.

The Sedgwick County hailstorm inflicted an estimated 70 million dollars in property damage—the costliest hailstorm to hit the area since 1992.

### June 6<sup>th</sup> Turon Windstorm

Shortly after midnight CST on the 6<sup>th</sup>, a small but intense thunderstorm slammed the town of Turon in southwest Reno County with 80 to 100 mph straight line winds. Three 57,000 bushel grain silos, three 28,000 bushel grain silos, and one 12,000 bushel grain bin were damaged or destroyed. Several transmission poles were downed, knocking out power to the entire town of Turon. A 20' by 30' section of roof was blown off a bank building in town. Numerous trees were damaged or completely destroyed, causing damage to at least 3 to 4 homes. In all, the windstorm caused over \$400,000 in damage.

## July 16-20<sup>th</sup> Heatwave

From July 16-20, a deadly heat wave gripped much of central, south-central and southeast Kansas. Broad high pressure in the mid and upper levels of the atmosphere caused temperatures to soar into the 105-110 degree range, with afternoon heat indices about the same. The cover of darkness provided little in the way of relief, as overnight temperatures were slow to fall off, reaching only the upper 70s by sunrise for many locations. Unfortunately, the prolonged heat claimed five lives across south-central and southeast Kansas. Three occurred in Wichita, one in Iola, and another in Coffeyville. The heat unofficially claimed three other lives, two in Wichita and one in Coffeyville. Additionally, dozens of individuals across central, south-central and southeast Kansas were treated for heat-related illnesses.



Damage from the June 6th Turon windstorm.

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## Summer 2006 In Review

By: Eric P. Schminke, General Meteorologist

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Although astronomical summer 2006 encompassed the period from June 21<sup>st</sup> at 726AM CDT to September 22<sup>nd</sup> at 1103PM CDT, meteorological summer envelopes the 3-month period from June 1<sup>st</sup> thru August 31<sup>st</sup>. The purpose of this article is two-fold:

1. To provide a statistical analysis for three cities, one each in Central, South-Central, and Southeast Kansas.
2. To provide extreme data, both temperature and rainfall, for each of the selected cities.

The three cities that will be studied in this article are:

Wichita (Mid-Continent Airport).

Salina.

Chanute.

### I. A Statistical Analysis of Summer 2006

Table 1A: SUMMER 2006 TEMPERATURE STATISTICS WICHITA

	AVERAGE MAXIMUM	AVERAGE MINIMUM	AVERAGE MONTHLY	DEPARTURE FROM NORMAL
JUNE	88.6	64.5	76.6	+1.1
JULY	96.0	71.2	83.6	+2.6
AUGUST	91.9	71.5	81.7	+1.9
SEASONAL	92.2	69.1	80.6	+1.9

Table 1B: SUMMER 2006 RAINFALL (INCHES) - WICHITA

	MONTHLY TOTAL	DEPARTURE FROM NORMAL
JUNE	6.32	+2.07
JULY	2.16	-1.15
AUGUST	5.93	+2.99
SEASONAL TOTAL	14.41	+3.91

Table 2A: SUMMER 2006 TEMPERATURE STATISTICS SALINA

	AVERAGE MAXIMUM	AVERAGE MINIMUM	AVERAGE MONTHLY	DEPARTURE FROM NORMAL
JUNE	91.8	65.0	78.6	+3.0
JULY	97.1	71.3	84.4	+3.1
AUGUST	92.5	69.6	81.3	+1.9
SEASONAL	93.8	68.6	81.4	+2.6

Table 2B: SUMMER 2006 RAINFALL (INCHES) – SALINA

	MONTHLY TOTAL	DEPARTURE FROM NORMAL
JUNE	4.62	+0.47
JULY	0.79	-3.53
AUGUST	6.70	+3.21
SEASONAL	12.11	+0.15

Table 3A: SUMMER 2006 TEMPERATURE STATISTICS CHANUTE

	AVERAGE MAXIMUM	AVERAGE MINIMUM	AVERAGE MONTHLY	DEPARTURE FROM NORMAL
JUNE	87.4	62.2	75.0	+0.7
JULY	93.6	69.2	81.6	+2.1
AUGUST	94.9	70.9	83.1	+5.1
SEASONAL	92.0	67.4	79.9	+2.6

Table 3B: SUMMER 2006 RAINFALL (INCHES) – CHANUTE

	MONTHLY TOTAL	DEPARTURE FROM NORMAL
JUNE	1.85	-3.20
JULY	2.45	-1.79
AUGUST	2.49	-1.47
SEASONAL	6.79	-6.46

## II. Extreme Temperature and Rainfall Data

### A. Wichita:

#### 1. Temperatures:

The hottest temperature was 109 degrees, which occurred on July 19<sup>th</sup> and 20<sup>th</sup> and in both cases, the temperatures established records. The two dates also figured in the longest streak in which the mercury cleared the 100-degree barrier; 5 days, from July 16<sup>th</sup> to the 20<sup>th</sup>. From the 17<sup>th</sup> through the 20<sup>th</sup>, afternoon highs reached either 108 or 109 degrees. A 3<sup>rd</sup> record high temperature was realized on July 26<sup>th</sup>, when the mercury soared to 105 degrees. On August 1<sup>st</sup>, the low temperature only settled to 80 degrees, establishing a record warmest low temperature for the date.

#### 2. Rainfall:

Referring to Table 1B, one notices that the greatest monthly rainfall occurred in June. The 24-hour rainfall exceeded 1 inch on three occasions: the 1<sup>st</sup>, 16<sup>th</sup>, and 21<sup>st</sup>, when strong to severe thunderstorms rumbled across the region. On the 16<sup>th</sup>, gusts were clocked at 56 mph, while on the 21<sup>st</sup>, 51 mph gusts whipped through Mid-Continent Airport.

### B. Salina:

#### 1. Temperatures:

Summer, 2006 was particularly hot, with high temperatures clearing the 100-degree barrier 25 times. The hottest day of the summer was July 17<sup>th</sup>, when the mercury soared to 109 degrees. However, the record for the date remained intact; 111 degrees set in 1934. There were two 6-day stretches during which temperatures broke 100 degrees: From July 15<sup>th</sup>-20<sup>th</sup>, and from August 5<sup>th</sup>-10<sup>th</sup>. Although no record high temperatures were set, there were six warmest low temperature events.

The 100-degree barrier was cleared 25 times this summer at Salina. However, no record high temperatures were set.

## 2. Rainfall:

June and August accounted for nearly all of summer rainfall, with both months combining for 11.32 inches, or 93% of the total. August was particularly wet, when 6.70 inches were measured. Nearly 2/3 of this total occurred on the 14<sup>th</sup>, 18<sup>th</sup>, and 19<sup>th</sup>, with calendar day totals of 1.55 inches on the 19<sup>th</sup>, and 1.39 inches on the 14<sup>th</sup> and 18<sup>th</sup>. The greatest calendar day total occurred on June 21<sup>st</sup>, when nearly two inches (1.95 inches to be exact) drenched the town.

### C. Chanute:

#### 1. Temperatures:

Chanute literally sweat it out with afternoon temperatures that reached 100 degrees 16 times. The most oppressive heat occurred on July 20<sup>th</sup> as well as on August 6<sup>th</sup> and 9<sup>th</sup>, when the mercury soared to 106 degrees. However, when humidity is figured into the equation, daytime heat indices reached around 110 degrees. Three record high temperatures were established: On July 20<sup>th</sup> (106), August 2<sup>nd</sup> (103), and August 9<sup>th</sup> (106). The nighttime provided little relief, with three record warmest low temperature records set: July 26<sup>th</sup> (79), July 31<sup>st</sup> (79), and August 9<sup>th</sup> (78).

Chanute broke the 100-degree barrier 16 times this summer.

#### 2. Rainfall:

Unlike Wichita and Salina, summer 2006 proved to be fairly dry in Chanute. The paltry 6.79 inch 3-monthly total was 6.46 inches below normal. Only once did a calendar day total exceed 1.00 inch, when 1.39 inches was measured on June 17<sup>th</sup>.

Residents of Central, South-Central, and Southeast Kansas certainly experienced their share of intense heat, especially from July 16<sup>th</sup> to August 15<sup>th</sup>, when nearly all of 100-degree plus high temperatures occurred. But what perhaps induced some people to think it was an historically hot summer was that overnight lows were very warm on several occasions, with a few low temperatures failing to settle below 80 degrees. But when compared to the history-makers, such as 1936 and 1980, when Wichita melted in 100-degree heat on a staggering 50 and 46 days, respectively, 2006 lagged far behind in terms of intense heat. Even in terms of consecutive days of 100-degree plus heat, 2006 failed to gain admission into the top-10.

From a rainfall standpoint, only Chanute gained admission into either "Top Ten" fraternity; be it driest or wettest. Based on available climate data, the scant 6.79 inches measured at Chanute from June 1<sup>st</sup> to August 31<sup>st</sup> enabled 2006 to rank as the 9<sup>th</sup> driest summer on record, and the driest since 1936, when only 3.43 inches, a shade over half the 2006 total, was measured. The summer of 1936 is Chanute's driest on record. It's intriguing that 2006, the 9<sup>th</sup> driest summer on Chanute's climate record, would follow in the wake of the driest winter in Chanute's history, when only 1.51 inches of water equivalent occurred during the meteorological winter of December 1<sup>st</sup>, 2005 to February 28<sup>th</sup>, 2006. What was the previous record for driest winter in Chanute? The winter of December 1<sup>st</sup>, 1935 to February 29<sup>th</sup>, 1936, when only 1.55 inches of water equivalent were measured; and that winter had the "benefit" of being a leap year.

The summer of 2006 lagged far behind the summers of 1936 and 1980 in regard to intense heat.

So, based on what transpired during the winter of 2005-06 and summer of 2006, what can one expect from a precipitation standpoint during this coming winter of 2006-07? A review of the Chanute climate record does not reveal a distinct trend or tendency between successive winters and summers and vice versa, so stay tuned. The National Weather Service in Wichita issues monthly outlooks. The outlook for the month in question is issued from 27<sup>th</sup> to the 30<sup>th</sup> of the preceding month. Therefore, the outlooks for December, 2006 will be issued November 28<sup>th</sup> or 29<sup>th</sup>; January, 2007 will be issued December 29<sup>th</sup> or 30<sup>th</sup>; and February, 2007 will be issued January 29<sup>th</sup> or 30<sup>th</sup>. One is certainly urged to be attentive to these outlooks. They contain a wealth of information, especially when one considers the timeframe involved.

June-August rainfall at Chanute was only 6.79 inches, 6.46 inches below normal—Chanute's 9<sup>th</sup> driest summer on record.

# Local Three-Month Temperature Outlook

By: Eric P. Schminke, General Meteorologist

In January 2007, the National Weather Service is expected to unveil the Local 3-Month Temperature Outlook. This product, which entered the experimental phase on July 21<sup>st</sup>, will provide a wealth of temperature outlook information in 3-month increments.

The first such outlook which commenced in September, enveloped the three month period of October, November, and December 2006. The next Local 3-Month Temperature Outlook that may be accessed will encompass the period November, December and January.

The local 3-month temperature outlook will provide a detailed temperature outlook out to one year in advance for 10 selected cities across Wichita's area of responsibility (generally central, south-central and southeast Kansas).

The Local 3-Month Temperature Outlook provides the client with an idea as to what the 3-month average temperature will be for the requested period. The product displays, in terms of percentages, the chances of the average 3-month temperature being in each of the following 3 categories or terciles:

“Above Normal”

“Near Normal”

“Below Normal”

One will be able to consult a total of 13 local 3-month temperature outlooks covering a span of one year. The product not only displays the probabilities of the average 3-month temperature being in a particular tercile, but also the expected average temperature range. For example, starting with the October issuance, one would be able to consult local 3-month temperature outlooks for each 3-month period from November, December (2006) and January 2007, thru November, December (2007) and January 2008.

Issued by the Climate Prediction Center in Washington D.C., the local 3-month temperature outlook is derived by applying the national temperature outlook to the local level. Known as “downscaling”, this product will provide a detailed temperature outlook for 10 selected cities and towns in Weather Forecast Office Wichita's area of jurisdiction. The 10 local 3-month temperature outlook sites are:

Chanute Martin Johnson Airport

El Dorado

Great Bend

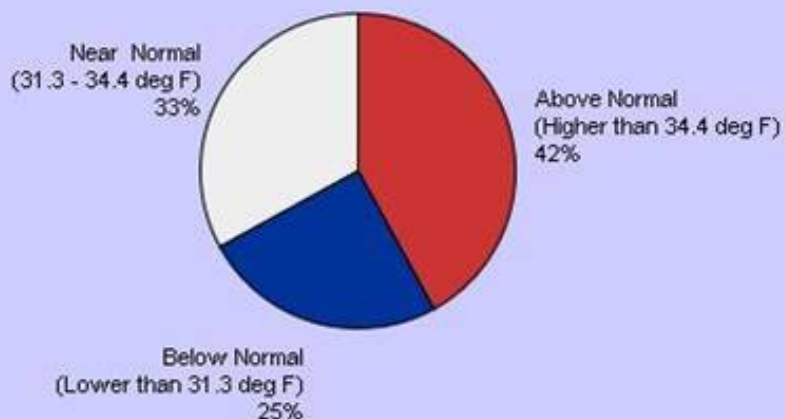
Hutchinson

Independence

McPherson

Russell

Salina Municipal Airport

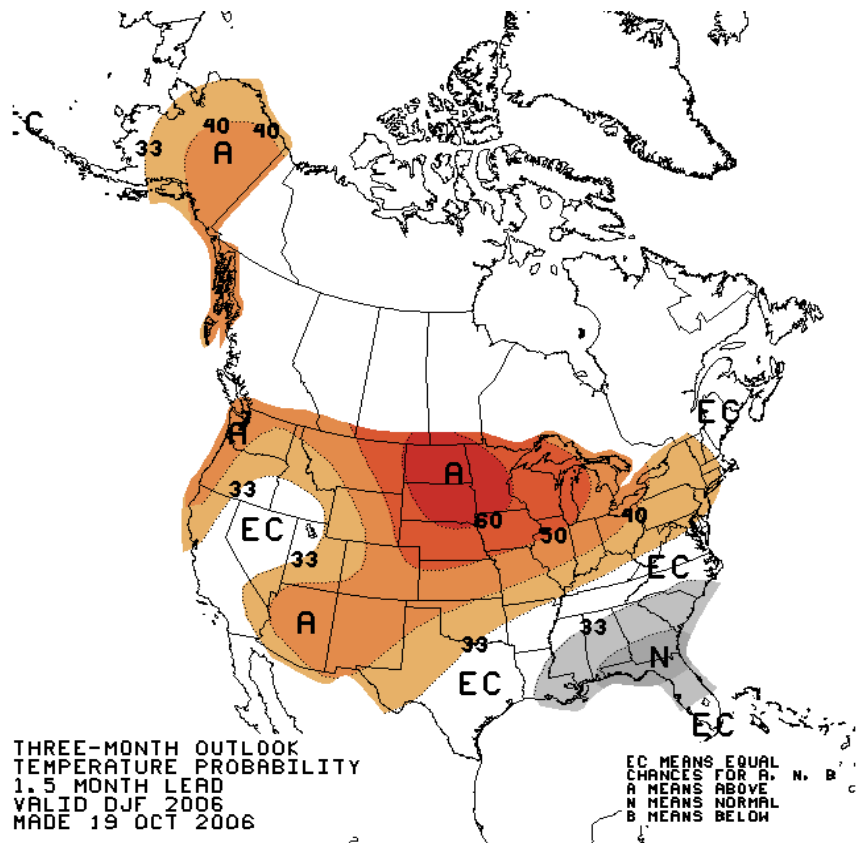


Local three-month (December-February) temperature outlook for Wichita. “Downscaled” from the page 9 graphic, this pie chart indicates there is a 42% chance that the three-month average temperature will be above normal (higher than 34.4 deg F).

Wichita Mid-Continent  
Airport  
Winfield

Since the product is in the experimental phase, one may become acclimated to the product by doing the following:

- 1) On our homepage, under the "Climate" directory, left click "Local".
- 2) Once the local climate webpage has been accessed left-click "Climate Prediction".
- 3) Once the "Climate Prediction and Variability" webpage has been accessed, left-click "Local 3-Month Outlook" that appears in the upper left-hand panel.
- 4) The map that appears displays each of the ten sites for which the Local 3-Month Temperature Outlook is available.
- 5) From the drop-down menu that appears one may display the Local 3-Month Temperature Outlook for the city or town selected. Since the cities/towns are listed in alphabetical order, the town that is immediately displayed is Chanute Martin Johnson Airport.



December-February temperature probabilities. Kansas has roughly a 40-50% chance that the average temperature during this time period will be above normal, with lower probabilities that temperatures will be near or below normal.

The local 3-month temperature outlook may be displayed by any of the following methods:

- 1) An Outlook Table.
- 2) A Probability of Exceedance Graph. Where one may assign one of five confidence levels, 99%, 95%, 90%, 75%, and/or 50%.
- 3) A Probability of Exceedance Calendar, which enables one to view the probability exceedance graph for each 3-month temperature outlook covering thirteen 3-month periods.
- 4) A Probability of Exceedance Table.
- 5) A Probability of Non-Exceedance Graph.
- 6) A Probability of Non-Exceedance Table.
- 7) A Temperature Range Chart, which, like methods 2 thru 6, may have a confidence level assigned to display the forecast confidence of an average temperature resulting in the range displayed.
- 8) A Three Category Calendar, which displays the temperature probabilities in the form of pie charts

for each of the next thirteen 3-month periods.

9) A Three Category Outlook, which is very similar to the Three Category Calendar.

Of the 9 methods described, method #s 8 and 9, both of which are displayed in the form of pie charts, will likely be the easiest for a client to use.

Any questions or comments pertaining to the content of the local 3-month temperature outlook may be brought to the attention of:

Eric P. Schminke  
General Forecaster and Climate Focal Point  
C/O WFO Wichita  
2142 S. Tyler Rd.  
Wichita, KS. 67209  
Email: [eric.schminke@noaa.gov](mailto:eric.schminke@noaa.gov)  
Phone: 316-942-8483

To access Local 3-Month Temperature Outlook:

- 1) <http://weather.gov/wichita>
- 2) Click on “Local” under “Climate” section
- 3) Click “Climate Prediction”
- 4) Click “Local 3-Month Outlook”

Being a new product, one is certainly encouraged to provide any commentary on this service. We look forward to hearing from you!

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## New Fire Weather Products Available From The National Weather Service

By Mary-Beth Schreck, General Meteorologist

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The National Weather Service offices in Kansas and Nebraska have begun to issue some new information for fire weather. The two main products that we began issuing on October 3<sup>rd</sup> are the:

- 1) Fire Weather Planning Forecast
- 2) Fire Weather Watch/Red Flag Warning.

The Fire Weather Planning Forecast is issued each day by 6 am, year round. Weather elements specific to fire weather are included in this product, such as relative humidity, mixing height, transport wind, and other relative elements. This product is available on our Internet homepage under the Fire Weather Program Area link.

The Fire Weather Watch/Red Flag Warning is issued as needed, year round. The Watch is issued 24 to 48 hours before Red Flag conditions are expected to be met, and the Red Flag Warning is issued if these conditions will be met within 24 hours. The Red Flag conditions for central through southeast Kansas are:

NWS Wichita's fire weather homepage can be found at:

<http://weather.gov/wichita/?n=firewx>

- 1) dry fuels
- 2) wind speeds greater than 20 mph (or gusts greater than 25 mph)
- 3) relative humidity values below 20%.

The Watch and Warning will be shown on the map on our homepage if either is in effect.

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## Reporting Winter Weather

By: Chance Hayes, Warning Coordination Meteorologist

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The National Weather Service needs your reports! Winter precipitation in the form of snow and ice is just as important as large hail, damaging winds, and tornadoes. It would be safe to say that winter precipitation indirectly produces more damage, injuries, and fatalities each year than those produced by thunderstorms. For this reason, it is extremely important for you to call our office to tell us how much snow has fallen or if the roads have become covered with ice. Your information will help us in our process of notifying the public where the hazards are located. The more people we can keep off of the roads in a winter event, the safer it will be. So the next time you get and snow or ice, give us a call to let us know how much you received.

We need your snow and/or ice reports!

<http://www.crh.noaa.gov/ict/scripts/stormreport/stormreport.php>

Let us know **how much snow and/or ice has accumulated** or **if the roads are covered with snow and/or ice**. Knowing how much snow has fallen helps us produce better forecasts.

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## Wichita American Meteorological Society (AMS) Chapter News

By: Brad Ketcham, Lead Meteorologist & President of Wichita AMS

### Chapter

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The Wichita chapter of the American Meteorological Society (AMS) hosted world renowned scientist Dr. David Houghton on October 12<sup>th</sup>, 2006 at the Wichita State Campus. Dr. Houghton from the University of Wisconsin (Madison) is well known in the climate community for his work on Global Climate change and Global Warming. Because of his world-wide travels as former President of the AMS (1995), and as a consultant at the World Meteorological Organization (WMO) in Geneva, Switzerland, Dr. Houghton has a unique perspective on the whole debate over "global warming" and whether the world's climate is changing.

The Wichita AMS chapter is open to anyone interested in meteorology.

The local chapter also had a very informative meeting at the beginning of June, about the devastation caused by Hurricane Katrina. Brian Stone, Emergency Manager for Cowley County, Kansas, gave his personal account of the devastation, as he was dispatched shortly after land fall for a month to Hancock County, Mississippi (Bay St. Louis) to help the local authorities recover from that terrible tragedy.

The Wichita chapter to the AMS is open to anyone with an interest in meteorology. Meetings are held on the first Thursday of the even numbered months (Ex...Aug, Oct.). The location of the meetings varies, based on the speaker scheduled. If interested in attending, go to the following website for more details:

<http://www.wichita-amsnwa.org/>

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# School and Tour Experiments

By: Rob Cox, Lead Meteorologist

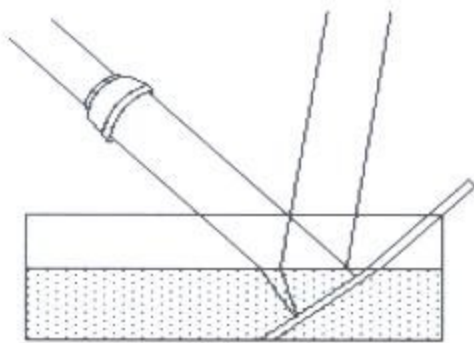
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The National Weather Service in Wichita will be adding something new to their school talks and tours starting in October 2006. This will include some ways to demonstrate what occurs in the atmosphere using scientific experiments. These experiments include studying the effects of air pressure, temperature and stability. We will also be creating lightning, rainbows, and developing a model of how clouds develop. Here is a taste of a couple of experiments that we will be conducting.

## Making a Rainbow:

Materials: bowl of water, small mirror, flashlight

Procedure: Place a mirror in a bowl of water, at about a 30 degree angle. Darken the room and then shine a flashlight toward the mirror. A rainbow will appear on the ceiling.



Explanation: The water acts as a prism, refracting each color at a slightly different angle.

## Making a lightning bolt:

Materials: metal dish, plastic putty, polyethylene, sheet, tape

Procedure: Tape a polyethylene sheet to a table. Stick the plastic putty in the middle of the metal dish. Place your hand on the putty to keep the dish in place while you rub the polyethylene sheet for



F1 tornado approaching the west side of Russell on September 21st. Photo Courtesy Russell Co. EM

about a minute. Turn the lights out, and place a metal object 2-3 millimeters from the plate. A bright spark will appear.



**Explanation:** Lightning happens when the negative charges (electrons) in the bottom of the cloud (or in this experiment the piece of metal) are attracted to the positive charges (protons) in the ground (or in this case a dish).

National Weather Service

2142 S. Tyler Road

Wichita, KS 67209

Phone: 316-942-8483

E-mail: [chance.hayes@noaa.gov](mailto:chance.hayes@noaa.gov)

<http://weather.gov/wichita>

Newsletter Editor:

Andy Kleinsasser, General Meteorologist

Email: [andy.kleinsasser@noaa.gov](mailto:andy.kleinsasser@noaa.gov)

"The National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information data-base and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community."